

## ELASTICALLY STRETCHABLE DISPOSABLE PANTS

## BACKGROUND OF THE INVENTION

This invention relates to elastically stretchable  
5 disposable pants such as a diaper, incontinent pants or the  
like.

Japanese Patent Application Publication No. 1995-155344A  
describes disposable pants comprising an elastically  
stretchable pants' basic structure and a pad member having a  
10 liquid-pervious topsheet, a liquid-impervious backsheet and a  
liquid-absorbent core disposed between the two sheets wherein  
the pad member is attached to the inner surface of the pants'  
basic structure. The pants' basic structure comprises a  
laminated composite sheet of elastically stretchable fibrous  
15 nonwoven fabric and elastically stretchable plastic film and  
has an omnidirectional stretchability. The pants' basic  
structure is composed of a front waist region, a rear waist  
region opposed to the front waist region, and first and second  
lateral waist regions extending between the front and rear waist  
20 regions in a waist-surrounding direction, respectively.  
Transversely opposite side edge portions of the pants' basic  
structure corresponding to those of the first and second lateral  
waist regions are bonded together so as to define a waist-

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opening and a pair of leg-openings.

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The Publication describes a manner in which the pants are worn by a wearer him- or herself as follows: The wearer inserts his or her legs into the leg-openings of the pants' basic structure and then pulls up the pants around his or her waist with the first and second lateral waist regions of the pants' basic structure grasped by fingers. However, here is a problem due to the omnidirectional stretchability of the pants' basic structure such that a friction generated between the pants and the wearer's skin as the pants' basic structure is pulled up causes the first and second lateral waist regions of the pants' basic structure to be more stretched upward than the front and rear waist regions. Consequently, the front and rear waist regions may often remain below the first and second lateral waist regions being pulled up. In other words, it may be often necessary for the wearer to pull up the front and rear waist regions after the first and second lateral waist regions have been pulled up. Thus such pants of prior art takes much time to wear them.

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## SUMMARY OF THE INVENTION

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A1 } It is an object of this invention to provide elastically stretchable disposable pants made of elastically stretchable

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sheet members improved so that the pants can be smoothly pulled up to a desired level at which the pants are properly worn.

According to this invention, there is provided elastically stretchable disposable pants having a longitudinal axis comprising: being made of elastically stretchable sheet members; a front waist region; a rear waist region opposed to the front waist region; a waist-opening and a pair of leg-openings defined by the front and rear waist regions jointed at side edge portions thereof to each other.

10 <sup>Sub A2</sup> The improvement according to this invention is in that each of substantially inelastic guide zones being provided between the longitudinal axis and each of the side edges of the front and rear waist regions, extending longitudinal of the pants between vicinity of a peripheral edge portion of the waist-opening and vicinity of each of the leg-openings.

15 <sup>Sub A3</sup> According to one preferred embodiment of this invention, the sheet members comprise layers of elastically stretchable fibrous nonwoven fabric and the nonwoven fabric is molten and solidified so that the guide zones have substantially no elastic stretchability.

20 <sup>Sub A4</sup> According to another preferred embodiment of this invention, the sheet members comprise layers of elastically stretchable fibrous nonwoven fabric and inelastic strips of

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CONT sheet are bonded to the guide zones with the nonwoven fabric being not stretched so that the guide zones have substantially no elastic stretchability.

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A5 5 According to still another preferred embodiment of this invention, a pad member comprising a liquid-pervious topsheet, a liquid-impervious backsheet and a liquid-absorbent core disposed between the top- and backsheets is attached to the inner surface of the pants and extend from the front waist to the rear waist region.

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A6 10 According to further another preferred embodiment of this invention, the pants comprise a liquid-pervious topsheet, a liquid-impervious backsheet and a liquid-absorbent core disposed between the top- and backsheets and extending from the front waist region to the rear waist region and wherein at least  
15 the backsheet of the top- and backsheets is formed with the sheet members.

## BRIEF DESCRIPTION OF THE DRAWING

Fig. 1 is a perspective view showing one embodiment of  
20 the disposable pants according to this invention as partially broken away;

Fig. 2 is a plan view showing the pants with a basic structure thereof and a pad member separated from each other;

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Fig. 3 is a sectional view taken along a line A - A in Fig. 1;

Fig. 4 is a sectional view taken along a line B - B in Fig. 2;

5 Fig. 5 is a perspective view showing another embodiment of the disposable pants according to this invention as partially broken away;

Fig. 6 is a plan view showing the pants as developed in the longitudinal direction as partially broken away; and

10 Fig. 7 is a sectional view taken along a line C - C in Fig. 6.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Details of an elastically stretchable disposable pants  
15 will be more fully understood from the description given hereunder with reference to the accompanying drawings.

Fig. 1 is a perspective view showing one embodiment of disposable pants according to this invention as partially broken away and Fig. 2 is a plan view showing the pants 1 with  
20 the pants' basic structure 2 and the pad member 3 separated from each other by disconnecting lateral waist regions R3, R4 of the pants' basic structure 2 from the pad member 3. The pants' basic structure 2 and the pad member 3 are formed symmetrically with

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respect to a longitudinal axis C. Referring to Fig. 1, a waist-surrounding direction is indicated by an arrow X and a leg-surrounding direction is indicated by an arrow Y. Referring to Fig. 2, a transverse direction is indicated by an arrow X and a longitudinal direction is indicated by an arrow Y. The expression used herein "inner surfaces" of the pants' basic structure 2 as well as of the top- and backsheets 8, 9 should be understood to be the surfaces facing the core 10 and the expression used herein "outer surfaces" thereof should be understood to be the surfaces thereof not facing the core 10. The pants 1 comprise the pants' basic structure 2 and the pad member 3 attached to the inner surface of the pants' basic structure 2.

The pants' basic structure 2 is formed with two layers of elastically stretchable hydrophobic fibrous nonwoven fabric having surfaces thereof facing each other intermittently bonded together. Alternatively, the pants' basic structure 2 may be formed with a composite sheet consisting of elastically stretchable hydrophobic fibrous nonwoven fabric and elastically stretchable plastic film laminated with the nonwoven fabric.

The pants' basic structure 2 has a front waist region R1, a rear waist region R2 opposed to the front waist region R1 and

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first and second lateral waist regions R3, R4 extending in a waist surrounding direction between the front and rear waist regions R1, R2, respectively. The pants' basic structure 2 define a waist-opening 14 and a pair of leg-openings 15.

5 As seen in Fig. 2, the pants' basic structure 2 has transversely opposite side edge portions 2a extending in the longitudinal direction and longitudinally opposite end portions 2b extending in parallel to each other in the transverse direction. Longitudinally middle sections 2a<sub>1</sub> of  
10 the respective side edge portions 2a curve inward in the transverse direction of the pants' basic structure 2 so as to describe circular arcs. The pants' basic structure 2 is elastically stretchable not only in its longitudinal direction but also in its transverse direction.

15 The longitudinally middle sections 2a<sub>1</sub> of the respective side edge portions 2a are provided with elastic members 4 bonded under tension thereto to be associated with the respective leg-openings. Each of the elastic members 4 comprises a plurality of elastic elements being elastically stretchable in  
20 the longitudinal direction. The longitudinally opposite end portions 2b are provided with elastic members 5 bonded under tension thereto to be associated with the waist-opening. Each of the elastic members 5 comprises a plurality of elastic

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elements being elastically stretchable in the transverse direction. Both the elastic members 4 associated with the leg-openings and the elastic members 5 associated with the waist-opening are disposed between the layers of nonwoven fabric forming the pants' basic structure and bonded to these layers of nonwoven fabric.

The first and second lateral waist regions R3, R4 in the pants 1 of this invention are, more specifically to define, the regions extending between the transversely opposite side edge portions 2a of the pants' basic structure 2 and transversely opposite side edge portions 3a of the pad member 3 which will be described more in details, respectively.

In the pants' basic structure 2, its transversely opposite side edge portions 2a except the longitudinally middle sections 2a<sub>1</sub> thereof are put flat and bonded together in a plurality of bonding zones 7 intermittently arranged in the longitudinal direction so as to shape the pants' basic structure 2 into the pants.

In the pants' basic structure 2, the longitudinally middle sections 2a<sub>1</sub> of the respective side edge portions 2a define the peripheral edge portions 2a<sub>1</sub> of the respective leg-openings 15 and the longitudinally opposite end portions 2b of the pants' basic structure 2 define the peripheral edge

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portion 2b of the waist-opening 14, as will be apparent from Fig. 1. The elastic members 4 associated with the respective leg-openings 15 extend along the peripheral edge portions 2a<sub>1</sub>, respectively, in the leg-surrounding direction. The elastic members 5 associated with the waist-opening 14 extends along the peripheral edge portion 2b in the waist-surrounding direction.

The first and second lateral waist regions R3, R4 are formed at locations put aside to the front waist region R1 with a plurality of substantially inelastic guide zones 6. More specifically, these guide zones 6 are intermittently arranged in the longitudinal direction between the vicinity of the peripheral edge portion 2b of the waist-opening 14 and the vicinity of the peripheral edge portions 2a<sub>1</sub> of the leg-openings 15. In these guide zones 6, the nonwoven fabric has been molten and thereafter solidified, so the nonwoven fabric in the zones has substantially no elastic stretchability. In these guide zones 6, the nonwoven fabric is no more fibrous and presents a film-like state. In an alternative arrangement, these guide zones 6 may be partially placed upon the side edge portions 3b of the pad member 3.

The pad member 3 comprises a liquid-pervious topsheet 8 made of a hydrophilic fibrous nonwoven fabric or a porous

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plastic film, a liquid-impervious backsheet 9 made of a hydrophobic fibrous nonwoven fabric, a liquid-impervious plastic film or a laminated composite sheet consisting of the hydrophobic fibrous nonwoven fabric and the plastic film laminated, a liquid-absorbent core 10 disposed between the top- and backsheets 8, 9, and a pair of substantially liquid-impervious leakage-barrier cuffs 11 made of a hydrophobic fibrous nonwoven fabric. The core 10 is entirely covered with and bonded to tissue paper (not shown) and bonded to the inner surfaces of the top- and backsheets 8, 9 with the tissue paper therebetween.

As seen in Fig. 2, the pad member 3 is contoured by transversely opposite side edge portions 3a extending in the longitudinal direction and longitudinally opposite end portions 3b extending in the transverse direction and generally comprises a front region r1 and a rear region r2. Longitudinally middle sections 3a<sub>1</sub> of the respective side edge portions 3a curve inward in the transverse direction of the pad member 3 so as to describe circular arcs. As indicated by chain lines in Fig. 2, the front region r1 lies in the front waist region R1 of the pants' basic structure 2 and the rear region r2 lies in the rear waist region R2 of the pants' basic structure 2. The outer surface of the backsheet 9 constituting the pad

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member 3 is bonded to the pants' basic structure 2 in a bonding zone 13 extending on the inner surface of the pants' basic structure 2 as indicated by an chain line.

Each of the cuffs 11 has a fixed side edge portion 11a  
5 extending in the longitudinal direction along the associated side edge portion 10a of the core 10, a free side edge portion 11b being contiguous to the fixed side edge portion 11a and normally biased to rise on the topsheet 8 and longitudinally opposite fixed end portions 11c collapsed inward in the  
10 transverse direction of the pad member 3 onto the topsheet 8. The free side edge portion 11b is provided with an elastic member 12 being stretchable in the longitudinal direction and bonded under tension to the free side edge portion 11b. The elastic member 12 is covered with a part of the free side edge portion  
15 11b.

To wear the pants 1, the wearer may insert his or her legs into the respective leg-openings 15 of the pants' basic structure 2 and pull the pants 1 up to his or her waist by grasping the first and second lateral waist regions R3, R4 with his or  
20 her fingers. In the pants' basic structure 2, movement of the guide zones 6 in the longitudinal direction causes the region extending in the vicinity of these guide zones 6 to move in the longitudinal direction. When this pants 1 is worn, the front

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waist region R1 also is pulled up following the movement of the guide zones 6 as the first and second lateral waist regions R3, R4 are pulled up, so it is not apprehended that the front waist region R1 might remain below the first and second lateral waist regions R3, R4 as the first and second lateral waist regions R3, R4 are pulled up to wear the pants 1. In other words, the front waist region R1 can be pulled together with the first and second lateral waist regions R3, R4 up to the desired level.

sub A7 Fig. 3 is a sectional view taken along a line A - A in Fig. 1 and Fig. 4 is a sectional view taken along a line B - B in Fig. 2. Of the pad member 3, transversely opposite side edge portions 8a of the topsheet 8 and transversely opposite side edge portions 9a extend outward beyond transversely opposite side edges 10a of the core 10. The side edge portions 9a are folded back along the side edges 10a of the core 10 toward the outer surface of the topsheet 8. The fixed side edge portions 11a of the respective cuffs 11 are disposed the side edge portions 8a and side edge portions 9a, respectively, and bonded to the inner surfaces of these side edge portions 8a, 9a. The longitudinal opposite fixed end portions 11c of the respective cuffs 11 are bonded to the outer surface of the topsheet 8 (See Fig. 2).

The pad member 3 is curved, in the longitudinal direction,

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with the topsheet 8 inside and contraction of the elastic members 11 causes the respective free side edge portions 11b to rise on the topsheet 8. In the pad member 3, the free side edge portions 11b of the respective cuffs 11 define barriers  
5 functioning to prevent leakage of excretion from the side edge portions 3a of the pad member 3.

Fig. 5 is a perspective view showing another embodiment of the disposable pants 20 according to this invention as partially broken away, Fig. 6 is a plan view showing the pants  
10 20 as developed in the longitudinal direction with the lateral waist regions R3, R4 having been disconnected from each other as partially broken away and Fig. 7 is a sectional view taken along a line C - C in Fig. 6.

sub A8 } The pants 20 comprise a liquid-pervious topsheet 21 made  
15 of an elastically stretchable hydrophilic fibrous nonwoven fabric, a liquid-impervious backsheet 22 made of an elastically stretchable hydrophobic fibrous nonwoven fabric and a liquid-absorbent core 23 disposed between the top- and  
20 backsheets 21, 22 and entirely cover with and bonded to tissue paper (not shown). Alternatively, it is possible to use a laminated composite sheet consisting of elastically stretchable hydrophobic fibrous nonwoven fabric and elastically stretchable plastic film as stock material for the

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backsheet 22.

The topsheet 21 and the backsheet 22 have surfaces thereof placed upon and intermittently bonded to each other. The core 23 is intermittently bonded to the inner surfaces of the top-  
5 and backsheets 21, 22 with the tissue paper therebetween.

The pants 20 has a front waist region R1, a rear waist region R2 opposed to waist front waist region R1 and first and second lateral waist regions R3, R4 extending in a waist surrounding direction between the front and rear waist regions  
10 R1, R2, respectively. The pants 20 define a waist-opening 29 and a pair of leg-openings 30.

As seen in Fig. 6, the pants 20 has transversely opposite side edge portions 20a extending in the longitudinal direction and longitudinally opposite end portions 20b extending in  
15 parallel to each other in the transverse direction. Longitudinally middle sections 20a<sub>1</sub> of the respective side edge portions 20a curve inward in the transverse direction of the pants 20 so as to describe circular arcs. The pants 20 is elastically stretchable not only in its longitudinal direction  
20 but also in its transverse direction.

The longitudinally middle sections 20a<sub>1</sub> of the respective side edge portions 20a are provided with elastic members 24 bonded under tension thereto to be associated with the

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respective leg-openings. Each of the elastic members 24 comprises a plurality of elastic elements being elastically stretchable in the longitudinal direction. The longitudinally opposite end portions 20b are provided with elastic members 25 bonded under tension thereto to be associated with the waist-opening. Each of the elastic members 25 comprises a plurality of elastic elements being elastically stretchable in the transverse direction. Both the elastic members 24 associated with the leg-openings and the elastic members 25 associated with the waist-opening are disposed between the top- and backsheets 21, 22 and bonded to these sheets 21, 22.

The first and second lateral waist regions R3, R4 in the pants 20 are, more specifically to define, the regions extending between the transversely opposite side edge portions 20a of the pants 20 and transversely opposite side edge portions 23a of the core 23, respectively.

In the pants 20, its transversely opposite side edge portions 20a except the longitudinally middle sections 20a<sub>1</sub> thereof are put flat and bonded together in a plurality of bonding zones 26 intermittently arranged in the longitudinal direction so as to obtain the desired pants-type.

The first and second lateral waist regions R3, R4 are formed at locations put aside to the and rear waist regions R1,

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R2 with a plurality of substantially inelastic guide zones 27, respectively. In these guide zones 27, inelastic strips of sheet 28 are bonded to the outer surface of the backsheet 22. These strips of sheet 28 are bonded to the backsheet 22 with both the topsheet 21 and the backsheet 22 being not stretched. These strips of sheet 28 vertically extend between the peripheral edge 20b of the waist-opening 29 and the peripheral edges 20a<sub>1</sub> of the respective leg-openings 30. Alternatively, it is possible to bond the respective strips of sheet 28 to the outer surface of the topsheet 21 or to dispose these strips of sheet 28 between the top- and backsheets 21, 22 and to bond them to the inner surfaces of these top- and backsheets 21, 22.

Inelastic fibrous nonwoven fabric or a flexible and inelastic plastic sheet may be used as stock material for the strips of sheet 28. The guide zones 27 may be formed by coating the inner surfaces of the top- and backsheets 21, 22 with inelastic adhesive and bonding these top- and backsheets 21, 22 to each other.

To wear the pants 20, the wearer pulls the first and second lateral waist regions R3, R4 so that movement of the guide zones 27 in the longitudinal direction causes the front and rear waist regions R1, R2. In this way, the front and rear waist regions R1, R2 also are pulled up following the movement of the guide

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zones 27 as the first and second lateral waist regions R3, R4 are pulled up, so the front and rear waist regions R1, R2 can be pulled up together with the lateral waist regions R3, R4 to the desired level without any anxiety that the front and rear  
5 waist regions R1, R2 might remain below the first and second lateral waist regions R3, R4.

The elastic stretchable nonwoven fabric may be selected from a group including those obtained by melt blown- or spun bond process. Component fiber of such nonwoven fabric may be  
10 stretchable fiber obtained by melt spinning thermoplastic elastomer resin. It is also possible to use, for this purpose, composite nonwoven fabric consisting of the nonwoven fabric made of thermoplastic elastomer resin fiber and the nonwoven fabric made of crimped fiber obtained by melt spinning  
15 thermoplastic synthetic resin such as polypropylene, polyethylene or polyester laminated on at least one surface of the first-mentioned nonwoven fabric.

The nonwoven fabric used as stock material for the top- and backsheets 8, 9 as well as the cuffs 11 of the pad member  
20 3 may be selected from those obtained by spun lace-, needle punch-, melt blown-, thermal bond-, spun bond-, chemical bond- and air through-processes. Component fiber of the nonwoven fabric may be selected from a group including polyolefine-,

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polyester- and polyamide-based fibers and polyethylene/polypropylene or polyethylene/polyester core-sheath type conjugated fiber and side-by-side-type conjugated fiber.

5           The cores 10, 23 are a mixture of fluff pulp, high absorption polymer particles and thermoplastic synthetic resin fiber compressed to a desired thickness. The polymer particles may be selected from a group including starch-, cellulose-based polymer and synthetic polymer.

10           To bond the pants' basic structure 2 of the pants to the pad member 3, the top- and backsheets 8, 9, 21, 22 one to another, the leakage-barrier cuffs 11 as well as the core 10 to the top- and backsheets 8, 9, the core 23 to the top- and backsheets 21, 22 and to attach the elastic members 4, 5, 12, 24, 25 to the  
15 pants, suitable adhesive such as hot melt adhesive or welding means such as heat-sealing or ultrasonic sealing may be used.

<sup>Sub</sup><sub>A9</sub> 7 The disposable pants according to this invention is characterized in that the first and second lateral waist regions are formed at locations put aside toward at least one of the  
20 front and rear waist regions with the substantially inelastic guide zones arranged in the longitudinal direction. Movement of the guide zones in the longitudinal direction causes the region extending in the vicinity of these guide zones to move

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in the longitudinal direction. The front and rear waist regions also are pulled up following the movement of the guide zones as the first and second lateral waist regions are pulled up to wear the pants, so the front and rear waist regions can be pulled up together with the lateral waist regions to the desired level without any anxiety that the front and rear waist regions might remain below the first and second lateral waist regions. In this way, the pants can be more smoothly pulled up to the desired level around the wearer's waist than the pants of well known art can be.

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